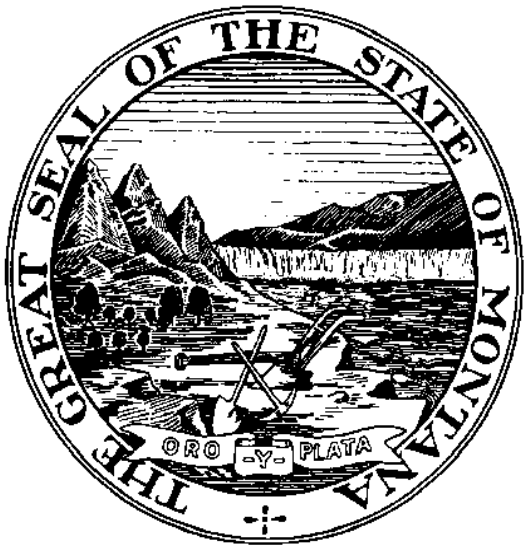
STATE OF MONTANA

Electronic Imaging Standards



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INTRODUCTION

The potential savings associated with electronic imaging are significant. An electronic imaging system can automate labor intensive manual file retrieval, improve service by allowing shared use of document images, instantly distribute documents throughout the organization, eliminate unneeded manual processes through re-engineering the workflow, eliminate loss due to misfiling, and reduce physical document storage space.

Because of potential cost savings and the promotion of state effeciencies, a committee consisting of representatives from various state agencies and Lewis and Clark County studied the issues facing the state in regards to imaging standards. This committee has developed standards and recommendations that are consistent with recognized existing industry standards and policies.

This document provides a platform for future imaging and data compatibility between systems installed by agencies, without mandating a particular vendor for hardware and software. By defining standards and recommendations, which emphasize planning and coordination, agencies can ease the technological transition and minimize legal and practical risks associated with each new system.

ISD has the responsibility to approve the procurement of imaging hardware, software, and services. ISD, in consultation with the Imaging Committee and the State Records Committee, will use this document to facilitate that process. (Appendix A contains the list of current Imaging Committee members). This document shall apply to all imaging systems, no matter the size. By specifying requirements and support resources needed for planning, implementing, and effectively using imaging, this document serves as a guide for state agencies or other entities who are considering imaging. For additional information on Information Systems Planning, Purchasing/Procurement, and Records Management, refer to MCA 2-17-501 and the following Montana Operations Manual (MOM) chapters:

Volume I:

- Chapter 1-0200 Automated Information Systems
- Chapter 1-0700 Purchasing
- Chapter 1-0800 Records Management

LIST OF STANDARDS

This section is meant for those who would prefer to reference the standards for a particular area, without the accompanying text.

I. MANAGEMENT ISSUES

A. DOCUMENT PROCESSING AND WORKFLOW

RECOMMENDATION:
Managers, in consultation with qualified records managers, should analyze the existing records systems, practices, workflow, and indexes, and correct any deficiencies before implementing an imaging system.

B. STORAGE

1. Recording Permanence

REQUIREMENT:
Before any paper or electronic records that have been entered into an electronic imaging system can be destroyed, deleted, or otherwise disposed of, an agency must go through the records disposal process as mandated in MCA 2-6-212.

STANDARD:
Use CD-R or WORM technology for records of legal or long-term value.

Records of legal or long-term value must be recorded on at least two separate electronic imaging disks and stored in separate locations.

Recycled electronic imaging media must not be used for the storage of legal, long-term, or required records.

Use high-quality electronic imaging media that comply with ANSI/ISO standards, procured from known manufacturers.

2. Storage Environment

STANDARD:
Electronic imaging disks used for legal or long-term storage must be inspected at least annually by the custodial agency. This should include a visual examination of the medium and its housing, and retrieval or playback of recorded information. An agency may chose to select a random sampling of disks for inspection in applications that contain numerous electronic imaging disks.

RECOMMENDATION:
Avoid storing electronic imaging disks in direct sunlight or near any intense heat source, including the top of disk drives.

Storage and work areas should be cleaned regularly and manufacturer's cleaning kits should be used to clean disk drives and media.

Never touch the recording surface of electronic imaging disks; handle disks gently and by the edges.

Eating, drinking, and smoking should be prohibited in areas where electronic imaging disks are used or stored.

Store electronic imaging disks in an upright, vertical position; do not stack horizontally. Do not place books or other heavy objects on top of electronic imaging disks.

Permanent magnets and other objects that generate magnetic fields should be prohibited in areas where any magnetic media are stored.

Never place labels directly on electronic imaging media.

C. LEGAL CONSIDERATIONS

REQUIREMENT:
The media and system combined must be able to show, to the court's criteria of acceptance, that the documents, records, or information :

- *Has relevancy (pertinent to the matter before the court).*
- *Is authentic (is a true and accurate copy of the original).*
- *Was made near to the time of the event in question.*
- *Was created and maintained as a regular course of business.*
- *Input procedures used to create this information are documented and defined and must be able to verify the accuracy by proven tests.*

1. **Evidence and Authenticity Requirements**

    a. **System Administrator**

RECOMMENDATION:
Each agency should assign an electronic imaging system administrator.

    b. **Audit Trail**

STANDARD:
Audit trails are required to indicate what actions have been taken place relative to the information.

    c. **Policy Statement**

STANDARD:
Each agency shall adopt a written policy statement that outlines the purpose of the imaging system, and safeguards that will be used to ensure that records stored on electronic imaging media are preserved.

D. RETENTION SCHEDULES

REQUIREMENT:
All public records to be put on an imaging system must have retention schedules approved by the State Records Committee, created before or during the planning stage for the system.

E. PUBLIC ACCESS AND PRIVACY

1. **Segregating Exempt and Non-Exempt Information**

STANDARD:
Whatever solution is used to provide public access to records while preserving privacy must maintain the integrity of the record as well as ensure that material exempted from disclosure is not accidentally made available to the general public.

2. **Access Through Time**

RECOMMENDATION:
Records custodians/managers should ensure that all records and information are transferred to new systems whenever the hardware, software, or storage medium is changed or upgraded.

3. Ability To Make Copies

RECOMMENDATION:
Records custodians/managers should ensure that copies of records and information on electronic imaging media are available to all public requesters on a fair, equitable, and cost effective basis. Copies of records should be made available to individuals regardless of their technological knowledge or whether they possess the latest technology. Public access of records should be considered when planning an imaging system.

F. TECHNICAL DOCUMENTATION

STANDARD:
Each agency shall maintain adequate system documentation.

G. OPERATIONAL DOCUMENTATION

REQUIREMENT:
Agencies whose records are likely to be used in legal matters must have procedures in place that will indicate the documents that were recorded on specific dates and identify the persons who performed scanning, indexing, and quality control procedures.

STANDARD:
Each agency shall document its operating procedures.

H. SECURITY

REQUIREMENT:
Each agency shall implement security provisions in accordance with MCA 2-15-114 and 2-17-503.

STANDARD:
An agency security strategy must include the following:

- *Control of data and information resources (including access and handling of sensitive information, audit trails, and incident reporting).*
- *Physical security and access to data processing facilities (including environmental controls, fire and water damage prevention and protection).*
- *Logical and data access controls (including personal identification and access,*

password controls, access to software and data, security of the application, data and file encryption, and network encryption).
- *Network security (including security at network entry and host entry, dial-up access).*
- *Backup and recovery (including contingency planning).*
- *Security awareness.*
- *User lists and access privileges that are internally reviewed regularly.*
- *Passwords that are changed regularly.*

I. LEGAL EXPUNGEMENT

RECOMMENDATION:
If expungement of records is being made because of a court order, replace the expunged document with the court order only if the court order does not contain identifying information. If the court order contains information identifying the expunged document, record a Change Notice instead.

Expungement documentation consists of the court order authorizing the expungement and the completed change order. If applicable, both documents should be written to the same disk as the expungement to which they refer.

All index entries to expunged information should be deleted.

In some cases a complete rewrite of the entire WORM disk and accompanying index may be needed. If this process is required, the original (source) disk, index, and all copies must be physically destroyed.

J. INTEGRATION WITH EXISTING AND OTHER INFORMATION SYSTEMS

RECOMMENDATION:
An imaging system should be able to be integrated with existing information systems and be able to adapt, grow, change, and cooperate with other systems and technologies. The system shall comply with all applicable State Standards. (See also Technical Issues, "Imaging Environment" section.)

K. SCANNER

RECOMMENDATION:
Each agency needs to look at their individual needs and select the options that best fit their application. (See also Technical Issues, "Scanning" section.)

L. QUALITY CONTROL

RECOMMENDATION:
Create quality control and monitoring procedures to prevent indexing errors.

Require periodic maintenance of digital imaging and electronic imaging media storage system.

Recalibrate electronic imaging drives annually.

Evaluate scanner quality based on standard procedures.

Perform visual quality control evaluation of each scanned image and related index data.

Write scanned image data to electronic imaging media only after quality control evaluation.

Establish a consensus on what constitutes the "best" image for different types of source documents. Periodically validate the scanning density selected by testing documents.

M. CONVERSION

1. In-house Conversion

RECOMMENDATION:
Base your estimated throughput rates on information derived from similar systems in operation.

2. Service Bureau/Imaging Contracted Services Conversion

RECOMMENDATION:
Work done by a service bureau or a contracted imaging service vendor should meet the same standards and procedures as an in-house conversion as specified by contract.

N. INDEXING

1. Index Location

RECOMMENDATION:
At retirement of an electronic imaging disk, the index information should be written to multiple locations on the disk that is being retired. If configuration allows, space should be saved on the disk to accommodate the index. (See also Technical Issues, "Images,

Indexes, and Data" section.)

2. Indexing Parameters

RECOMMENDATION:
Each agency should perform careful analysis of data access points to determine appropriate indexes.

Each agency should create standardized naming conventions for all data values.

The index should utilize the most unique characteristics relative to the document that is to be imaged.

Each state agency should consider the potential sharing of information with other state agencies. Use of standard software, such the Oracle database, will promote data sharing.

3. Index Data Entry

STANDARD:
Regardless of the data entry method chosen, index entry verification must be performed to ensure the accuracy of index information and to prevent rendering an image unretrievable due to a mis-entered character. (See also Technical Issues, "Images, Indexes, and Data" section.)

O. SECURITY

1. Media Selection

RECOMMENDATION:
Read-only electronic imaging disks should be utilized for records of legal and long-term value.

If an agency uses rewritable electronic imaging disks, read/write privileges must be carefully controlled and each edit or alteration must be documented to protect against tampering or accidental loss of data.

2. Backup

RECOMMENDATION:
Records of legal or long-term value stored on electronic imaging disks should have replacement copies made periodically on fresh media to guard against image loss due to media instability. A schedule for regular replacement should be adhered to based on the life expectancy of the storage media. Off-site storage of media should be considered in a long-term backup plan.

3. Access Restrictions

STANDARD:
Imaging systems must include access restriction procedures and software controls to prevent the retrieval of images or index information by unauthorized personnel.

Exempt information must be identified and concealed from unauthorized access.

RECOMMENDATION:
Access control procedures should be fully documented.

P. SYSTEM MIGRATION

1. Vendor Stability

RECOMMENDATION:
Assess carefully the viability of vendors when acquiring imaging systems that are heavily vendor-dependent. Consider imaging systems built from hardware and software that conform to non-proprietary standards or generally accepted standards within the industry.

When using vendor dependent proprietary hardware and/or software, strongly consider requiring the vendor to deposit a copy of the computer software source code with a bank or some other mutually acceptable escrow agent. Software upgrades should be deposited with the same escrow agent.

2. System Obsolescence

STANDARD:
Agencies must require vendors to provide a bridge to imaging systems with non-proprietary configurations.

RECOMMENDATION:

Agencies should minimize the obsolescence of imaging systems by:

- *Acquiring an imaging system that is backward compatible.*
- *Requiring the vendor to guarantee the conversion of 100 percent of the stored images and index data in lieu of the system not being backward compatible.*

3. Media Longevity

RECOMMENDATION:
Environmental storage conditions and periodic copying should be considered when developing a migration strategy.

4. Migration Strategies

STANDARD:
Strategies must be developed by the users of electronic imaging systems to migrate existing data into new systems or configurations.

As applications migrate to newer systems, existing backup copies of the data must be replaced as necessary to ensure that they may be accessible within the operating parameters of upgraded or successive systems.

RECOMMENDATION:
Budget annually between ten and twenty percent of the original system acquisition costs for maintenance, upgrades, and potential system migration. This will allow system replacement every five to ten years.

Test and evaluate the condition of storage media and system functionality on a regular basis.

II. TECHNICAL ISSUES

A. STORAGE

1. Disk Data Storage

RECOMMENDATION:
Select imaging systems that utilize the UDF standard for disk format.

2. Image Storage Software

STANDARD:
Image storage software must support the storage of images on intermediate storage devices (electronic media - direct access storage device (DASD)) and electronic imaging storage devices while providing backup,recovery, and restart capabilities consistent with a production- class data base management system (DBMS) for both images and the index.

3. Recording Permanence

STANDARD:
Use CD-R or WORM technology for records of long-term and/or legal value. Each agency must ensure that read/write privileges are carefully controlled and that an audit trail of rewrites is maintained when rewritable technology is used.

RECOMMENDATION:
Rewritable technology may be used for applications where long-term retention is not a requirement. This technology may be used to store temporary "working" copies of documents.

4. Jukebox Systems

RECOMMENDATION:
Select a jukebox storage system by considering overall access needs and physical control requirements.

5. Storage Environment

RECOMMENDATION:
Store electronic imaging media in areas with stable room temperatures (65 to 75

degrees Fahrenheit) where the relative humidity does not exceed 50 percent and does not fall below 30 percent. (See Appendix B for more information on storage environment).

An electrostatic copier or other electronic device may cause electrical interference, thus an electronic imaging system should be located in an appropriate area.

Periodically clean electronic imaging media and equipment, according to the manufacturer's recommended guidelines, to remove dust and other particulates.

6. Electronic imaging Platters Substrate

RECOMMENDATION:
Either polycarbonate or tempered glass substrate is acceptable.

7. Single-sided/Dual-sided Recording

RECOMMENDATION:
Select single-sided disks to avoid incompatibility issues.

8. Disk Durability

RECOMMENDATION:
Select electronic imaging disks with a pre-write shelf life of at least five (5) years and a post-write life of at least twenty (20) years.

B. COMPRESSION AND DECOMPRESSION

1. Compression

STANDARD:
Digital imaging systems must support the CCITT standards with no proprietary alterations to the algorithm.

Software used for compression must be 100% compatible with hardware used for compression.

2. Decompression

STANDARD:

Software used for decompression must be 100% compatible with hardware used for decompression. The software and hardware used for compression must also be 100% compatible with the software and hardware used for decompression.

C. SCANNING

1. Scanning Density

STANDARD:
Select a scanning density of at least 200 dots per inch (dpi) for office documents.

RECOMMENDATION:
Select a higher scanning density of between 300 and 600 dpi, as needed, for engineering drawings, maps, and documents with background detail. (See also Management Issues, "Scanner" section.)

Validate the selected scanning density with tests on actual documents.

2. Scanner Color Spectrum

RECOMMENDATION:
Select a scanning density that has been validated by testing the color spectrum on actual documents.

3. Gray-Scale

RECOMMENDATION:
As a general rule, use of gray-scale should be restricted to continuous-tone photographs.

4. Image Enhancement

RECOMMENDATION:
Get the "best" image whenever possible. Where legal issues do not exist, enhancement of the image is acceptable, however, always consider the record type when capturing the "best" image. (See also Management Issues, "Legal Considerations" section.)

D. IMAGING ENVIRONMENT

1. Operating Systems

STANDARD:
Must support the current state/university system operating systems.

2. Image Presentation On A Workstation

STANDARD:
Must support the state/university system Graphical User Interface (GUI) environments listed below.

- *Windows 3.1 or later [state].*
- *Windows NT [state and university].*
- *XWindows standard (XWindows 11 or above). [university-system, or GIS-related systems].*

3. Network Communication

STANDARD:
If network communication is required, the imaging system must utilize state/university system supported networking protocols:

- *TCP/IP [state and university].*
- *IPX [state and local only].*
- *DECnet [university and some state].*

If network communication is required, the imaging system must operate in the state/university system Local Area Network (LAN) topologies:

- *Token Ring [state].*
- *Ethernet [university system and some state].*
- *FDDI.*

RECOMMENDATION:
If network communication is required, the imaging system should co-exist in the state/university system network application environment:

- *Novell.*
- *SNA/Attachmate 3270 (Attachmate's Extra 3270 connectivity).*
- *Pathworks.*

4. Presentation (End User) Workstations

RECOMMENDATION:
For state government, an IBM compatible workstation is the standard and should have as a minimum:

CPU:	*Consult with ISD for current recommendation.*	
Monitor:	*Less Than 1 Hour Viewing/Day:*	*15" VGA*
	1 - 4 Hours Viewing/Day:	*17" SVGA*
	Greater Than 4 Hours Viewing/Day:	*19" SVGA*
	Should support a maximum dot pitch of .28mm for color images.	
Memory:	*Consult with ISD for current recommendation.*	
Bus:	*EISA, ISA, VESA, or PCI.*	
Mouse:	*System should be equipped with a mouse.*	

For university environments, in addition to the above listed configurations for IBM compatible workstation, the option of a UNIX based workstation is available. The UNIX standard should have as a minimum:

UNIX Environment

Operating System:	*POSIX compliant/OSF Version V compliant operating system with OSF/MOTIF presentation interface is acceptable.*
System Unit:	*Select hardware from the same vendor that is providing the UNIX operating system to ensure compatibility. Be certain the system unit is sized to handle the throughput requirements of the imaging system.*

5. Imaging Application Hardware Platform

RECOMMENDATION:
Agencies should involve the appropriate technical organization (ISD or university computer center management) early in the decision process when selecting an application hardware platform.

E. IMAGES, INDEXES, AND DATA

1. Image Distribution

STANDARD:
The system must be able to distribute images in one of the following formats, at the option of the sender:

- *CCITT Group 3 or Group 4 FAX (recognizing Group 3 destination).*
- *Bit-mapped.*

2. Image Annotation and Modification

RECOMMENDATION:
The imaging system should support the ability to annotate an image without physically modifying the image.

3. File Headers

STANDARD:
Use non-proprietary file header formats to label digital images.

Require the system developer to supply a detailed definition of the image file header label structure. (Note: A TIFF file header standard has been developed by the CCITT group.)

4. Image Folder Management

RECOMMENDATION:
Image folder management software should support the combining of images into a single folder and should allow access to a single image in a folder.

5. Image Indexing

STANDARD:
Image indexing must be done using an American National Standards Institute (ANSI)

Standard Query Language (SQL) Data Base Management System (DBMS) which can reside remote from the image storage location. The index must be accessible and manipulatable through user-written standard application development languages, subject to the appropriate security considerations.

6. Image Entry

RECOMMENDATION:
The imaging system should provide automatic indexing at entry from bar codes, Optical Character Recognition (OCR), Intelligent Character Recognition (ICR), and/or operator entry. As technologies evolve (OCR and ICR), use industry standards wherever possible and avoid proprietary equipment, unless proper precautions are taken (See Section P "System Migration").

7. Redundant Index

STANDARD:
The index data for the contents for a specific disk must be written at more than one location on the disk. Also, note "when" the index is actually written to disk. Software must rewrite the index every time the disk is unloaded.

MAIN DOCUMENT

I. MANAGEMENT ISSUES

The adoption of imaging technology by a government agency is a major decision that carries with it responsibilities that extend well beyond the acquisition of the original hardware and software.

A. DOCUMENT PROCESSING AND WORKFLOW

Processing documents generally involves routing items from one workstation to the next, the use of electronic in and out baskets, workflow monitoring to avoid bottlenecks, and procedures such as batching to avoid the loss of documents in transit through the process. Imaged documents move electronically through the work place and the associated software can monitor, assign, track, and account for all documents in the work process.

In addition to concentrating document storage in a small physical space, imaging systems can retrieve documents in seconds or minutes with a degree of accuracy that cannot be matched by manual filing. Assuming that the system has an effective index strategy, documents would not be misfiled. Documents can be cross-indexed and, to the user, appear to reside in more than one file simultaneously.

Digital imaging and electronic imaging media applications, however, cannot solve access problems stemming from inefficient manual or computerized information systems and practices. In fact, electronic imaging media applications (like other information technologies) may exacerbate existing deficiencies. Maximum benefits are realized when existing workflow procedures are analyzed and adapted to take advantage of the new technology, rather than just automating existing processes.

RECOMMENDATION:
Managers, in consultation with qualified records managers, should analyze the existing records systems, practices, workflow, and indexes, and correct any deficiencies before implementing an imaging system.

B. STORAGE

1. Recording Permanence

Electronic imaging storage is often described by vendor literature as "archival." This is true in a data processing context, where "archiving" generally means removing information from on-line to off-line storage. In a public records context, however, electronic imaging media life

expectancies do not approach archival requirements which must have the ability to retain original information bearing characteristics indefinitely. In fact, research literature indicates that electronic imaging media are relatively unstable compared to the abundant paper and microfilm which comprise most public records. Estimates vary as to the length of time an electronic imaging disk can reasonably be expected to maintain the integrity of the information stored on it.

Due to the lack of national or international standards for electronic imaging media and the state of flux that the electronic imaging storage industry is in, the Montana State Records Committee has issued an Administrative Rule regarding records stored on electronic imaging systems. See ARM 44.14.102 for requirements of long-term storage.

Additionally, practical organizational concerns such as the inability of the State Archives, at this time, to accession and manage electronic imaging media requires that archival and long-term storage of the original records must still be microfilm or paper based. The agency is not responsible for the actual storage, which is the concern of the State Archives, but only in providing the State Archives with the original paper records or an archival quality microform copy.

As media are constantly changing, there is no guarantee that new equipment is backward compatible with older media. In addition, some media sizes and types will probably be discontinued in the future. Information that is particularly irreplaceable should also be recorded and stored on microfilm or paper to avoid such potential problems. Some systems make it possible to accomplish this at the same time.

REQUIREMENT:
Before any paper or electronic records that have been entered into an electronic imaging system can be destroyed, deleted, or otherwise disposed of, an agency must go through the records disposal process as mandated in MCA 2-6-212.

In addition to the life expectancy issue of electronic imaging media in general, each of the three types of electronic imaging recording media (WORM, CD-E, and CD-R) have technical differences that affect the life expectancy of the media:

- **Records stored on WORM media cannot be altered or erased.**
- **CD-Erasable (CD-E) technologies allow the imaged records to be changed or erased over and over.**
- **CD Recordable (CD-R) disks are becoming popular. They are a read-only medium that can be produced by relatively inexpensive equipment and can be read by virtually any CD reader. They currently hold 650 megabytes. A new standard will soon be in production that holds in excess of 4 gigabytes per disk.**

Obviously, the type of electronic imaging recording media will affect the records stored on them. Issues of legal acceptance and long-term access must be taken into account when choosing an electronic imaging recording media.

STANDARD:
CD-R or WORM technology must be utilized for records of legal or long-term value.

CD-E should not be used unless a proper audit trail is provided.

Records of legal or long-term value must be recorded on at least two separate electronic imaging disks and stored in separate locations.

Recycled electronic imaging media must not be used for the storage of legal, long-term, or required records.

Use high-quality electronic imaging media that comply with ANSI/ISO standards, procured from known manufacturers.

2. Storage Environment

Electronic imaging media are highly resistant to damage. However, environmental effects, media wear, and accidental erasure are potential problems if the media is not handled and stored properly. See Appendix B for National Media Labs' chart on temperature and humidity effects.

In addition to the recommendations in Part I "Technical Issues", the following recommendations are made.

STANDARD:
Electronic imaging disks used for legal or long-term storage must be inspected at least annually by the custodial agency. This should include a visual examination of the medium and its housing, and retrieval or playback of recorded information. An agency may chose to select a random sampling of disks for inspection in applications that contain numerous electronic imaging disks.

RECOMMENDATION:
Avoid storing electronic imaging disks in direct sunlight or near any intense heat source, including the top of disk drives.

Storage and work areas should be cleaned regularly and manufacturer's cleaning kits should be used to clean disk drives and media.

Never touch the recording surface of electronic imaging disks; handle disks gently and by the edges.

Eating, drinking, and smoking should be prohibited in areas where electronic imaging disks are used or stored.

Store electronic imaging disks in an upright, vertical position; do not stack horizontally. Do not place books or other heavy objects on top of electronic imaging disks.

Permanent magnets and other objects that generate magnetic fields should be prohibited in areas where any magnetic media are stored.

Never place labels directly on electronic imaging media.

C. LEGAL CONSIDERATIONS

There is nothing in the law that states that electronic imaging applications are not legal. The problem is the acceptability by the courts for this format. It took 100 years for the courts to accept paper as a satisfactory substitute for a person that could be cross-examined. It took forty years for microfilm to be accepted. Various standards groups (AIIM, NSTA,and ANSI) have been working on this issue for five years. It is very likely that within the next three to five years there will be a number of precedent-setting cases establishing the acceptance of this medium to the court's satisfaction.

Overall, only a limited amount of information maintained on an imaging system may be of legal significance. The information that falls into this category must be dealt with accordingly. The courts will determine just what information and in what format is acceptable. An agency can build a strong presumption of acceptance, however, if rules are adhered to. The following requirements are listed for this purpose. Full participation of the agency legal staff will be necessary to develop the particular detail.

REQUIREMENT:
The media and system combined must be able to show, to the court's criteria of acceptance, that the documents, records, or information :

- *Has relevancy (pertinent to the matter before the court).*
- *Is authentic (is a true and accurate copy of the original).*
- *Was made near to the time of the event in question.*
- *Was created and maintained as a regular course of business.*
- *Input procedures used to create this information are documented and defined and must be able to verify the accuracy by proven tests.*

The following elements define ways of accomplishing these requirements:

1. Evidence and Authenticity Requirements

Montana law, at present, is ambiguous on the legal status of electronic images. The Association for Information and Image Management (AIIM) is currently working on developing performance guidelines for the legal acceptance of records produced by information technology systems. The final report will include a uniform law that Montana may consider incorporating. The performance criteria will be for processes and systems used to produce records and information, independent of the actual media or technology, to accommodate future changes and yet meet the needs of courts, regulatory agencies, and the public.

Common law requirements for admissibility of evidence have been codified under the Federal Rules of Evidence, which have been adopted by Montana. For evidence to be admissible, it must be properly authenticated, which involves the ability of the custodian to demonstrate to the satisfaction of the court that the image has not been altered and is an accurate representation of the document it purports to be. Imaging poses problems for authentication because of the potential for abuse. Abuse is undetectable because any area of an image can be magnified and retouched pixel-by-pixel. Once altered, the original can be erased and the new image in effect becomes the "original." In many systems, the original document will no longer exist once it has been scanned. This manipulability of the information in an imaging/bit mapped storage system is one of the geatest barriers to overcomming the rules of evidence and the hearsay rule objections. The answer to these concerns will not be of a plug-and-play variety. It will take a very tightly coordinated effort of the program manager, the information resource unit and staff legal personnel to lay the proper foundation for court acceptance. The most significant concept to retain regarding the legal acceptance of the imaging process is this: in the absence of being able to certify the document, you must be able to certify the system to the court's satisfaction.

To enhance authenticity, and thereby minimize challenges to legal admissibility of the evidence, the following implementation and operational guidelines are offered.

a. System Administrator

Each agency that uses an imaging system should designate an electronic imaging system administrator with responsibility for system management and operation. This person would be able to give knowledgeable testimony about the system by understanding such procedures as:

- How backup operations are performed.
- How changes are applied to the system.
- Who is authorized to perform system changes/backups.
- How are audit trails created for system changes/backups.

- What the policy is regarding use and operation of the system.

RECOMMENDATION:
Each agency should assign an electronic imaging system administrator.

b. Audit Trail

Because information on an imaging system can be changed, audit trails are necessary to verify these changes.

STANDARD:
Audit trails are required to indicate what actions have been taken relative to the information.

c. Policy Statement

Agency management must formally recognize the importance of proper system management and maintenance. To this end, agencies should adopt a policy statement that includes the mission of the agency, the purpose of the system, and the safeguards that an agency will use to ensure that digitized public records stored on electronic imaging media are preserved.

STANDARD:
Each agency shall adopt a written policy statement that outlines the purpose of the imaging system, and safeguards that will be used to ensure that records stored on electronic imaging media are preserved.

D. RETENTION SCHEDULES

A retention period is the time the record is needed for administrative, fiscal, legal, historical, and research purposes. All government records, including those stored in imaging systems, should be maintained and disposed of as part of a legally-accepted records management program in order to ensure their acceptance as legal documents. Refer to MCA 2-6-213, 2-15-103.

REQUIREMENT:
All public records to be put on an imaging system must have retention schedules approved by the State Records Committee, created before or during the planning stage for the system.

E. PUBLIC ACCESS AND PRIVACY

There are three areas of concern involved in ensuring access to public records stored on

electronic imaging disks: segregating exempt and non-exempt information, access through time, and the ability to make copies.

1. Segregating Exempt and Non-Exempt Information

Many electronic imaging systems store information exempted from public disclosure (e.g., confidential information such as Social Security numbers) on the same storage media as information open to public access. Yet non-exempted information can be requested by the public and the state agency must be able to comply with reasonable requests. In WORM and CD-ROM systems, selective data cannot be erased. Thus, making a new disk would be required. There are software solutions that allow certain fields or records to be masked from view.

STANDARD:
Whatever solution is used to provide public access to records while preserving privacy must maintain the integrity of the record as well as ensure that material exempted from disclosure is not accidentally made available to the general public.

2. Access Through Time

When records custodians store public records on electronic imaging disks, they commit themselves to providing access to those records for as long as they are useful. Imaging vendor's hardware, software, and storage media is changing rapidly and does not necessarily adhere to national standards. To ensure that records are not lost before their usefulness is finished, managers must take into consideration the costs of migrating the older information to newer systems to ensure its continued accessibility. Custodians of records with long-term value, where the originals have been sent to the State Archives in either paper or microform, do not have to worry about this particular problem since the original copy should suffice for public use. Agencies, whose records are likely to be of interest to the public, should consider any potential legal problems when providing the public with electronic imaging disk copies.

RECOMMENDATION:
Records custodians/managers should ensure that all records and information are transferred to new systems whenever the hardware, software, or storage medium is changed or upgraded.

3. Ability To Make Copies

Custodians and managers of records may be requested to make copies of electronic imaging records in a variety of formats and media types. Requests for copies of records held in imaging systems or access to imaging systems will be honored to the extent the request is compatible with

the features of the imaging system. There are no laws in Montana, however, that address this issue. Custodians/managers, therefore, should be prepared to ensure that copying policies are fair and equitable to all requesters. In the case of storage media, it makes sense to offer copies in paper, microform, or electronic media.

RECOMMENDATION:
Records custodians/managers should ensure that copies of records and information on electronic imaging media are available to all public requesters on a fair, equitable, and cost effective basis. Copies of records should be made available to individuals regardless of their technological knowledge or whether they possess the latest technology. Public access of records should be considered when planning an imaging system.

F. TECHNICAL DOCUMENTATION

It is important to document all aspects of the system application, both the technical specifications of the hardware and software components and the administrative uses of the full system in the normal course of agency business (see also Management Issues, "Evidence and Authenticity Requirements" section). Such documentation provides an essential foundation for assuring the legal integrity of the system.

Full technical documentation of system components, application software, and operating systems is essential to facilitate long-term access to records stored on electronic imaging media.

1. System Documentation

a. Hardware

Documentation should indicate the types, brand names, and model numbers of all hardware components (including equipment and recording media) used in the system, together with the dates that specific hardware components were put into or taken out of service. Documentation should also include hardware systems administrator manuals specifying standard hardware configurations (e.g., cabling) and specialized configurations (e.g., communications), and original equipment manufacturer (OEM) manuals for all hardware subsystem components.

b. Software

Documentation for systems software and application programs should indicate version numbers and implementation dates for all software upgrades. Users should make backup copies of all application software. If application software was developed on a customized basis, flowcharts,

source code, and other developmental documentation should be included. In cases where the developer/seller of the system retains ownership, agencies should require the seller to deposit a copy of the computer code with a bank or other facility for the storage of records, for use by the agency if the vendor's business fails. If a system runs in a UNIX environment, access to the super-user ID and password, the stand-alone boot disk and the stand-alone rebuild disk is essential. For DOS applications, operating system documentation, as well as user and system administrator manuals are required, especially if images are transferred on a communications network.

STANDARD:
Each agency shall maintain adequate system documentation.

G. OPERATIONAL DOCUMENTATION

Application-specific operational procedures that describe methods for scanning images, indexing them, verifying the accuracy of the index terms and the image quality, safeguards to prevent tampering or unauthorized use, and problems encountered over time and measures taken to address them, including hardware and software modifications, should also be documented.

Scanning, data entry, and quality control procedures must be fully documented for each electronic imaging storage application. Written instructions should be prepared for operators of all equipment used in document scanning, index data entry, and image inspection. In the case of document scanning, the instructions should indicate the scanning resolution and image compression algorithm to be used in a given application. An audit trail should indicate the names of the persons who operated the equipment on specific dates. Quality control procedures should likewise be specified in writing and a quality control log maintained. The audit trail should indicate the inspections, scanner tests, or other quality control procedures performed on specific dates. Any problems encountered from the use of the system and the measures used to solve those problems, including any manner in which the hardware or software was modified, should also be documented. Agencies should also maintain records of all information describing the indexing system used.

Some analysts also recommend the preparation of identification certificates for document images recorded on electronic imaging disks. Such certificates may be recorded on the electronic imaging disk cartridges themselves or maintained in a separate file.

REQUIREMENT:
Agencies whose records are likely to be used in legal matters must have procedures in place that will indicate the documents that were recorded on specific dates and identify the persons who performed scanning, indexing, and quality control procedures.

STANDARD:
Each agency shall document its operating procedures.

H. SECURITY

Access control procedures, such as password protection and privilege controls, should be fully documented. A list of all users and their access privileges should be maintained and audited regularly. The list should differentiate those users who are authorized to record document images or edit index data from those who are restricted to retrieval of document images from specified files.

REQUIREMENT:
Each agency shall implement security provisions in accordance with MCA 2-15-114 and 2-17-503.

STANDARD:
An agency security strategy must include the following:

- *Control of data and information resources (including access and handling of sensitive information, audit trails, and incident reporting).*
- *Physical security and access to data processing facilities (including environmental controls, fire and water damage prevention and protection).*
- *Logical and data access controls (including personal identification and access, password controls, access to software and data, security at the application level, data and file encryption, and network encryption).*
- *Network security (including security at network entry and host entry, dial-up access).*
- *Backup and recovery (including contingency planning).*
- *Security awareness.*
- *User lists and access privileges that are internally reviewed regularly.*
- *Passwords that are changed regularly.*

I. LEGAL EXPUNGEMENT

Custodians of public records who are required by court order to expunge information from public records stored with WORM technology must ensure that the public record remains accurate, complete, and legally acceptable. Maintaining file integrity is best accomplished by documenting expungement practices and documenting the nature and the purpose of each change to information in the public record. Guidelines for the expungement of information stored on

WORM technology are outlined in the AIIM technical report TR28-1991, *The Expungement of Information Recorded on Optical Write-Once-Read-Many (WORM) Systems*.

RECOMMENDATION:

If expungement of records is being made because of a court order, replace the expunged document with the court order only if the court order does not contain identifying information. If the court order contains information identifying the expunged document, record a Change Notice instead.

Expungement documentation consists of the court order authorizing the expungement and the completed change order. If applicable, both documents should be written to the same disk as the expungement to which they refer.

All index entries to expunged information should be deleted.

In some cases a complete rewrite of the entire WORM disk and accompanying index may be needed. If this process is required, the original (source) disk, index, and all copies must be physically destroyed.

J. INTEGRATION WITH EXISTING AND OTHER INFORMATION SYSTEMS

A primary consideration should be the ability of an imaging system to integrate with the existing information systems within the agency or the state (see current standards in place). This applies to both databases and communications. Also, to the maximum extent possible, the application should support industry standards that allow the import/export of text, numbers, and graphics between the imaging system and other applications.

RECOMMENDATION:

An imaging system should be able to be integrated with existing information systems and be able to adapt, grow, change, and cooperate with other systems and technologies. The system shall comply with all applicable State Standards. (See also Technical Issues, "Imaging Environment" section.)

K. SCANNER

The input device for electronic imaging systems is the scanner. A scanner converts images (documents) to computer-processible, digitized codes for storage on disk, magnetic tape, or other storage media.

The following is a list of scanner types:

- Flatbed type is similar to a planetary microfilm camera where the documents, usually oversize or fragile, are hand fed one document at a time.

- Feed-through type is similar to photocopy machines or microfilm rotary cameras where stacks of records can be processed without interruption.
- Scanners also are available to scan records previously converted to roll microfilm, jackets, microfiche, or aperture cards, or to integrate optical character recognition (OCR) or intelligent character recognition (ICR) into the scanning function as a means of reducing operator data entry and self-indexing the document.

The type of scanner chosen will depend on the type and condition of the original documents, the desired quality of the image displayed on the screen and/or hard copy output, speed of throughput desired, type and extent of indexing required, and financial constraints. Most scanners will support barcode applications.

RECOMMENDATION:
Each agency needs to look at their individual needs and select the options that best fit their application. (See also Technical Issues, "Scanning" section.)

L. QUALITY CONTROL

Obtaining high-quality images requires continuous monitoring for process control and product quality. Process control requires that equipment operate at optimum levels as specified by the manufacturer. Regular equipment maintenance and periodic calibration of electronic imaging media drives are important process control procedures. Standard test procedures for assessing scanner accuracy, published by AIIM, should be followed. (Refer to AIIM's book on all standard documents.)

It is crucial that documents are indexed correctly; documents that are indexed incorrectly may be lost forever. Indexing is essentially a manual process, subject to human error. Controls and monitoring procedures need to be put in place to assure that indexing errors do not occur.

RECOMMENDATION:
Create quality control and monitoring procedures to prevent indexing errors.

Require periodic maintenance of electronic imaging media storage system.

Recalibrate electronic imaging drives annually.

Evaluate scanner quality based on standard procedures.

Perform visual quality control evaluation of each scanned image and related index data.

Write scanned image data to electronic imaging media only after quality control evaluation.

Establish a consensus on what constitutes the "best" image for different types of source documents. Periodically validate the scanning density selected by testing documents.

M. CONVERSION

1. In-house Conversion

The time it will take to convert a given body of documents depends on a combination of scan time and indexing time. A rule of thumb is one scanner for every two indexers. Typically, scanner manufacturers' claims about throughput rates are based upon ideal or near ideal conditions. Consequently, it is crucial that samples of actual documents be scanned and indexed to provide estimates of throughput. The actual throughput will not be known until the imaging personnel have been trained and have had time to get up to speed. Because of the various factors that must be taken into consideration, an absolute throughput rate cannot be recommended. Each agency needs to look at their individual needs and select the options that best fit their application.

RECOMMENDATION:
Base your estimated throughput rates on information derived from similar systems in operation.

2. Service Bureau/Imaging Contracted Services Conversion

A service bureau is an outside agency hired to do the document conversion. Using a service bureau to convert documents has several benefits. It is not necessary to invest in scanning equipment nor to recruit and train additional staff members. If a service bureau is used then it is important that the contract specify what constitutes acceptable image quality and indexing, how many images will be stored on each electronic imaging platter, and any confidentiality issues (security requirements, legal ramifications of security, etc.). Furthermore, rigorous quality control procedures should be incorporated into the contract. Each electronic imaging platter should be subjected to a rigorous review to ensure that all documents are scanned and that the image quality is acceptable.

Also available are vendors that provide contracted imaging services. These companies will perform a variety of imaging services from installing a system to document conversion. When establishing a contract with other contracted imaging service vendors the same requirements and issues discussed above with service bureaus should also be considered.

RECOMMENDATION:

Work done by a service bureau or a contracted imaging service vendor should meet all the same standards and procedures as an in-house conversion as specified by contract.

N. INDEXING

Proper indexing is critical for an imaging system, given the volume of documents stored in a typical system. If the index is poorly planned or executed, documents will not be retrievable.

1. Index Location

The indexes for imaging systems are usually stored on a separate magnetic storage media. For "fail-safe" security storage of the database index or when a particular electronic imaging disk is retired, index information can also be written to the electronic imaging disk(s) from which the index information is derived.

RECOMMENDATION:
At retirement of an electronic imaging disk, the index information should be written to more than one location on the disk that is being retired. If configuration allows, space should be saved on the disk to accommodate the index. (See also Technical Issues, "Images, Indexes, and Data" section.)

2. Indexing Parameters

Indexing parameters are the categories of information by which document images are indexed for retrieval. The parameters should be based on the retrieval needs of current and future users of the system. The selection of index parameters should occur at the time the system is designed. This will allow the system designers to modify system components to accommodate indexing needs. The State Archives services of the Montana Historical Society can assist with identifying possible retrieval needs of future users.

Establishing index parameters may require a reassessment of existing office operating procedures. For example, multiple access points may be required (e.g., name, location, Social Security number) or a single unique identifier may be sufficient (e.g., case number).

RECOMMENDATION:
Each agency should perform careful analysis of data access points to determine appropriate indexes.

Each agency should create standardized naming conventions for all data values.

The index should utilize the most unique characteristics relative to the document that is

to be imaged.

Each state agency should consider the potential sharing of information with other state agencies. Use of standard software, such as the Oracle database, will promote data sharing.

3. Index Data Entry

Index data entry is the entry of values into fields that correspond to the system's index parameters. Data entry can be accomplished while scanning is done, immediately after, or at some longer interval by someone other than the scanner operator. The importance of and confidentiality of the information and records must be taken into account when determining who is authorized to do the indexing. That, in turn, will help determine when the indexing is done.

Data entry can be done via key-entry, downloading of values, or auto-indexing. Key-entry is the most common method and is generally done in conjunction with the inspection of scanned images. As each image is verified for accuracy, the inspector uses a database management program to enter index values. If an automated index has been previously created for paper or microfilm records prior to their conversion to digital images, the existing database information can be downloaded to the index database. Some imaging systems employ the use of barcoding, optical character recognition (OCR), or intelligent character recognition (ICR) to minimize key entry of index information.

STANDARD:
Regardless of the data entry method chosen, index entry verification must be performed to ensure the accuracy of index information and to prevent rendering an image unretrievable due to a mis-entered character. (See also Technical Issues, "Images, Indexes, and Data" section.)

O. SECURITY

State data, whether on an imaging system or any information storage system, is a valuable asset of the state and must be protected from unauthorized modification, destruction, or disclosure, whether accidental or intentional. The protection of assets is a management function. Security needs must be considered and addressed in all phases of development of new information processing systems. Proper security measures can protect against unauthorized access or modification and loss, contamination, or destruction.

1. Media Selection

Read-only electronic imaging disks do not allow for the alteration or editing, erasure, or write-

over of images. The use of rewritable electronic imaging disks requires that each edit or alteration must be able to be audited to protect against purposeful or accidental tampering with recorded images.

RECOMMENDATION:

Read only electronic imaging disks should be utilized for records of legal and long-term value.

If an agency uses rewritable electronic imaging disks, read/write privileges must be carefully controlled and each edit or alteration must be able to be audited to protect against tampering or accidental loss of data.

2. Backup

Backup procedures are used to create security copies of digitized images and their related indexes. Backup affords immediate replacement of lost information or damaged media and the ability to resume operations on auxiliary systems in the event of system failure.

Security copies can be created in several ways. Some systems allow for the simultaneous recording of images on two electronic imaging disk cartridges, thereby creating a working copy and a security copy simultaneously. Batch mode duplication methods can be used to record all or part of a given electronic imaging disk to a second disk at regular intervals. Another procedure copies the contents of an electronic imaging disk onto magnetic tape.

Index information can be duplicated onto magnetic storage media, such as tape or floppy disks, onto microfilm/fiche through the use of Computer-Output Microfilm (COM), or onto an electronic imaging disk. Index information can also be recorded in several places on the electronic imaging disk itself as an additional precaution against loss of critical retrieval information.

RECOMMENDATION:

Records of legal or long-term value stored on electronic imaging disks should have copies made periodically on fresh media to guard against image loss due to media instability. A schedule for regular duplication should be adhered to based on the life expectancy of the storage media. Off-site storage of media also should be considered in a long-term backup plan.

3. Access Restrictions

Access to certain public records, particularly those containing personal information, may be restricted to authorized personnel. In such cases, the system must include software controls that restrict the retrieval of index information or images by unauthorized personnel.

STANDARD:
Imaging systems must include access restriction procedures and software controls to prevent the retrieval of images or index information by unauthorized personnel.

Exempt information must be identified and concealed from unauthorized access.

RECOMMENDATION:
Access control procedures should be fully documented.

P. SYSTEM MIGRATION

Imaging technologies are rapidly changing and evolving. Each new generation of hardware and software makes preceding generations somewhat obsolete. When long-term or permanent records are stored on electronic imaging disks, the ability to access those images in subsequent generations or configurations of hardware and software becomes a significant concern. The primary goal of migration is to maintain long-term access to records and information.

Maintaining access over time to records stored on imaging media requires ensuring continuous readability and intelligibility. In this context, continuous readability means; 1) processing images on the computer system and device they were created on, and 2) accessing images over time without errors, both on the original system and any subsequent system. Ensuring readability over time entails adherence to proper environmental conditions, periodic testing for uncorrectable read errors, and periodic recopying. Proprietary header labels and compression techniques, and software obsolescence are major barriers to intelligibility over time.

Potential limitations in the long-term viability of electronic imaging technology arise in three broad areas: vendor stability, system obsolescence, and media longevity.

1. Vendor Stability

It is incumbent upon managers to assess carefully the viability of vendors when acquiring imaging systems that are heavily vendor or manufacturer-dependent. In lieu of ready-made guarantees of long-term corporate stability, some analysts recommend having proprietary vendor and manufacturer computer software placed in an escrow account for future access in the case of corporate failure.

RECOMMENDATION:
Assess carefully the viability of vendors when acquiring imaging systems that are heavily vendor-dependent. Consider imaging systems built from hardware and software that conform to non-proprietary standards or generally accepted standards within the

industry.

When using vendor dependent proprietary hardware and/or software, strongly consider requiring the vendor to deposit a copy of the computer software source code with a bank or some other mutually acceptable escrow agent. Software upgrades should be deposited with the same escrow agent.

2. System Obsolescence

Obsolescence is inherent in any information technology. It now seems apparent that electronic imaging media is far more durable and stable than the hardware and software required to maintain access. This argues strongly for a very proactive approach to both routine system maintenance and periodic system upgrade to preserve the usability of the system as a whole. A useful way to mitigate the impact of information technology obsolescence is to require that new generations of information technology be backward-compatible (i.e., they can read and convert information written by an older generation of technology to the newer one). A good example of what is called "backward compatibility" is the capability of high density floppy disk drives to read disks formatted on lower density drives. Backward compatibility can facilitate the transfer of records of long-term value to future generations of technology. In order to achieve this goal, any system upgrades or new systems must have backward compatibility to systems containing records of long-term value.

STANDARD:
Agencies must require vendors to provide a bridge to imaging systems with non-proprietary configurations.

RECOMMENDATION:
Agencies should minimize the obsolescence of imaging systems by:

- *Acquiring an imaging system that is backward compatible.*
- *Requiring the vendor to guarantee the conversion of 100 percent of the stored images and index data in lieu of having the system not being backward compatible.*

3. Media Longevity

The durability and longevity of the electronic imaging disks have already been discussed in other portions of this document.

RECOMMENDATION:
Environmental storage conditions and periodic copying should be considered when

developing a migration strategy.

4. Migration Strategies

An essential component in ensuring the long-term access to electronic imaging data is a migration strategy that can move records of continuing value from one technology generation to another.

The following technology migration strategies are three possible approaches to providing a sound platform for technology migration over time.

- Upgrade equipment as technology evolves and periodically recopy electronic imaging media as required.
- Recopy electronic imaging media based upon projected longevity (e.g., ten years).
- Transfer data from an obsolete generation of electronic imaging storage technology to a newly emerging generation, in some cases bypassing the intermediate generation that is mature, but at risk of becoming obsolete.

STANDARD:
Strategies must be developed by the users of electronic imaging systems to migrate existing data into new systems or configurations.

As applications migrate to newer systems, existing security copies of the data must be duplicated as necessary to ensure that they may be accessible within the operating parameters of upgraded or successive systems.

RECOMMENDATION:
Budget annually between ten and twenty percent of the original system acquisition costs for maintenance, upgrades, and potential system migration. This will allow replacement every five to ten years.

Test and evaluate the condition of storage media and system functionality on a regular basis.

Q. DISASTER RECOVERY

Disaster recovery is critical to any data processing system. Consult the Computing Policy and Development Unit of ISD for more information on this subject.

R. PLANNING

The methods used to develop an imaging system are similar to the processes employed in the development of a standard data processing system. For additional information on Information Systems Planning, Purchasing/Procurement, and Records Management, refer to the following Montana Operations Manual (MOM) chapters:

Volume I:
- Chapter 1-0200 Automated Information Systems
- Chapter 1-0700 Purchasing
- Chapter 1-0800 Records Management

S. CHANGES/ADDITIONS

If you wish to submit any changes or additions to this document, please contact the Computing Policy and Development Unit of ISD.

II. TECHNICAL ISSUES

A. STORAGE

1. Disk Data Storage

RECOMMENDATION:
Select imaging systems that utilize the UDF standard for disk format.

2. Image Storage Software

This software coordinates the transfer of images from input devices to storage devices and provides standard backup and recovery features.

STANDARD:
Image storage software must support the storage of images on intermediate storage devices (electronic media - direct access storage device (DASD)) and electronic imaging storage devices while providing backup,recovery, and restart capabilities consistent with a production- class data base management system (DBMS) for both images and the index.

3. Recording Permanence

Write-once-read-many (WORM), erasable (CD-E), and read-only (CD-R) electronic imaging media recording technologies each offer advantages and disadvantages. WORM offers a greater level of data security, enhancing the integrity of the information stored on the media. It is possible that accidental or intentional erasure of data with substantial legal, financial, or long-term value stored on rewritable media could occur. The selection of WORM, CD-E, or CD-R must be linked to the user's application requirements, available resources, and the level of standardization achieved by the electronic imaging media storage technologies.

STANDARD:
Use WORM technology for records of long-term and/or legal value. Each agency must ensure that read/write privileges are carefully controlled and that an audit trail of rewrites is maintained when rewritable technology is used.

RECOMMENDATION:
CD-E technology may be used for applications where long-term retention is not a requirement. This technology may be used to store temporary "working" copies of documents.

4. Jukebox Systems

The key factor in making a decision about a jukebox storage system is understanding the purpose of the imaging system and how it will be used. A multiple drive system, rather than a jukebox storage system, is more appropriate when simultaneous on-line access to information stored on multiple disks is required or when speed of data access is needed.

A jukebox storage system may be required when:

- The access delays and risks of damage or theft inherent in the manual selection, insertion, and refiling of electronic imaging disks are unacceptable to managers and users.
- It is important to provide remote access or configure a multi-user access system.
- Physical control of the electronic imaging media is required.

RECOMMENDATION:
Select a jukebox storage system by considering overall access needs and physical control requirements.

5. Storage Environment

Electronic imaging media are not immune to hostile storage environments, particularly high humidity and airborne particles. Electronic imaging media should be stored in a stable environment where the relative humidity does not exceed 50% or fall below 30% and the temperature is no greater than 75 degrees Fahrenheit on a year-round basis. Particular attention must be paid to ensuring that electronic imaging media drive systems are not located in environments with high levels of particulate matter, especially electrically-charged carbon particles from laser printers and electrostatic copy machines. In order to minimize problems of temporary read errors, electronic imaging media should be cleaned periodically to remove dust, particulates, and fingerprints. Unless there is a high incidence of flagged read errors, periodical cleaning based on the frequency of use is adequate.

See Appendix B for a National Media Labs chart providing more details.

RECOMMENDATION:
Store electronic imaging media in areas with stable room temperatures (65 to 75 degrees Fahrenheit) where the relative humidity does not exceed 50 percent and does not fall below 30 percent.

An electrostatic copier or other electronic device may cause electrical interference, thus

an electronic imaging system should be located in an appropriate area.

Periodically clean electronic imaging media and equipment, according to the manufacturer's recommended guidelines, to remove dust and other particulates.

6. Electronic imaging Platters Substrate

Both polycarbonate and tempered glass substrate offer advantages and disadvantages, including cost, storage, and handling requirements. If kept in an appropriate storage environment, however, both substrate are likely to last longer than the disk drives and the software.

RECOMMENDATION:
Either polycarbonate or tempered glass substrate is acceptable.

7. Single-sided/Dual-sided Recording

The selection of single or dual-sided recording is largely a function of costs and storage required on a single disk. The two sides of a dual-sided recording cannot be read at the same time on a jukebox or other stand-alone electronic imaging readers. Thus, one has the option of inserting another disk or flipping a dual-sided disk over and re-inserting it into the reader. Because these recording media are typically application and institution specific, only a general recommendation is being offered.

RECOMMENDATION:
Select single-sided disks to avoid incompatibility issues.

8. Disk Durability

Most vendors guarantee a shelf life of five years before recording, a period of time that should be adequate for any electronic imaging media application program. The longevity of electronic imaging media after recording should be at least twenty years in order to ensure ample time to transfer recorded information to the media.

RECOMMENDATION:
Select electronic imaging disks with a pre-write shelf life of at least five (5) years and a post-write life of at least twenty (20) years.

B. COMPRESSION AND DECOMPRESSION

1. Compression

Compression reduces the large volume of raster image data resulting from the conversion process using mathematical formulas to encode the data. Compression is a critical factor in image transmission and storage of data on electronic imaging media, reducing storage requirements from five to fifty times for imaged data. There are two broad classes of compression formulas: proprietary and standard. Proprietary compression tends to be faster and offers greater compression capabilities; but the stored images may not be transportable between different systems because of the algorithm's specialized nature. Standardized compression algorithms, while generally not as powerful, support image data transfer between systems that otherwise might be incompatible. Standard, or non-proprietary, compression techniques are an indispensable part of a migration strategy for records of long-term value.

The imaging system should support the Consultative Committee on International Telegraphy and Telephone (CCITT), Tagged Image Format (TIF), Joint Photographic Experts Group (JPEG) or other approved world-wide communications usage standards. Compression techniques should be CCITT compliant.

STANDARD:
Digital imaging systems must support the CCITT standards with no proprietary alterations to the algorithm.

Software used for compression must be 100% compatible with hardware used for compression.

2. Decompression

Decompression is the reverse operation of document compression. Decompression software returns the compressed, or encoded data, to the original size and condition of the originally scanned document. It should be noted that multiple vendors could be involved with compression and decompression algorithms for a single imaging system.

STANDARD:
Software used for decompression must be 100% compatible with hardware used for decompression. Hardware and software used for decompression must be 100% compatible with the hardware and software used for compression.

C. SCANNING

1. Scanning Density

The selection of scanning density involves a trade-off between image legibility and storage because increasing the scanning density increases storage requirements. The selection of scanner resolution has an impact on the readability of screen displays, the quality of hard copy output, the amount of file storage required, and the usefulness of the electronicl images for other applications. If the documents to be scanned include maps, drawings, or documents with background detail, a test should be conducted to verify the appropriate scanning density on a case-by-case basis.

STANDARD:
Select a scanning density of at least 200 dots per inch (dpi) for office documents.

RECOMMENDATION:
Select a higher scanning density of between 300 and 600 dpi, as needed, for engineering drawings, maps, and documents with background detail. (See also Management Issues, "Scanner" section.)

Validate the selected scanning density with tests on actual documents.

2. Scanner Color Spectrum

Because some scanners may not capture the full color spectrum, particularly yellow and sepia tones, it is possible to lose significant detail in scanning a document containing color. Special filters can be used to alleviate this problem.

RECOMMENDATION:
Select a scanning density that has been validated by testing the color spectrum on actual documents.

3. Gray-Scale

Gray-scale is necessary when scanning continuous-tone photographs. Gray-scale can be used in combination with a low scanning density (e.g., 150 dpi) to produce very high quality images when it is important to capture and retain as much of the original detail of a document as possible. However, this results in a trade-off entailing increased storage costs and a high resolution gray-scale monitor.

RECOMMENDATION:
As a general rule, use of gray scale should be restricted to continuous-tone photographs.

4. Image Enhancement

The original scan of the image always produces images with some loss of detail from the original. Image enhancement improves readability by increasing visual contrast and removing unwanted "noise." Electronically enhanced images display more clearly on a screen and print on paper more cleanly. Image enhancement reduces storage requirements by improving the efficiency of image compression software. Difficult to read documents such as carbon copies, multi-generation photocopies, light blue and purple mimeographs, faded and/or stained originals, and faint pencil and ink annotations are prime candidates for image enhancement. The ability to electronically enhance (e.g., pixel-by-pixel, adjusted contrast, etc.) the image quality of the originally scanned documents that have legibility problems is a very attractive aspect of digital imaging. There are no objective empirical indicators of acceptable image quality for digitally scanned images. Loss of substantial detail (e.g., ink color) should not be permitted.

One way to deal with this is to categorize documents based upon level of legibility (e.g., poor to very good) and then scan a sample of the documents and vary the enhancement algorithm settings. An agency could then review the originals and the scanned output images and reach a consensus on the "best" image for each category of documents. The enhancement algorithm settings used for the "best" images would become the operational criteria for acceptable image quality.

RECOMMENDATION:
Get the "best" image whenever possible. Where legal issues do not exist, enhancement of the image is acceptable, however, always consider the record type when capturing the "best" image. (See also Management Issues, "Legal Considerations" section.)

D. IMAGING ENVIRONMENT

1. Operating Systems

STANDARD:
Must support the current state/university system operating systems.

2. Image Presentation On A Workstation

Image presentation is the ability to use a windowing environment in a "well behaved manner." This includes the capabilities to open multiple windows in an overlapped manner, to scroll windows independently, to move windows, to close windows without terminating the application, to multi-task to the extent of allowing a local, host, and image application to be active in separate windows simultaneously.

STANDARD:
Must support the state/university system Graphical User Interface (GUI) environments listed below.

- *Windows 3.1 or higher [state].*
- *Windows NT [state and university].*
- *XWindows standard (XWindows 11 or above). [university-system, or GIS-related systems].*

3. Network Communication

Images must be transported between initial creation (generally scanning), storage, and the workstation. Imaging presents challenges to network design due to the large data volumes that are transported. Current technology, however, can satisfactorily address network capacity within most work places. Generally, token ring and ethernet local area networks provide adequate transmission capacities for many applications.

STANDARD:
If network communication is required, the imaging system must utilize state/university system supported networking protocols:

- *TCP/IP (state and university).*
- *IPX (state and local only).*
- *DECnet (university and some state).*

If network communication is required, the imaging system must operate in the state/university system Local Area Network (LAN) topologies:

- *Token Ring [state].*
- *Ethernet [university system and some state].*
- *FDDI.*

RECOMMENDATION:
If network communication is required, the imaging system should co-exist in the

state/university system network application environment:

- *Novell.*
- *SNA/Attachmate 3270 (Attachmate's Extra 3270 connectivity).*
- *Pathworks*.

4. Presentation (End User) Workstations

Given the need to have people view and act on large volumes of images, multiple workstations are needed. Typical image applications employ from several dozen to several hundred workstations. Presentation workstations for general government applications tend to be based on microcomputers with the addition of oversized and higher resolution displays, and cards or software for managing the image transmission and manipulation in the microcomputer.

RECOMMENDATION:
For state government, an IBM compatible workstation is the standard and should have as a minimum:

CPU:	*Consult with ISD for current recommendation.*	
Monitor:	*Less Than 1 Hour Viewing/Day:*	*15" VGA*
	1 - 4 Hours Viewing/Day:	*17" SVGA*
	Greater Than 4 Hours Viewing/Day:	*19" SVGA*
	Should support a maximum dot pitch of .28mm for color images.	
Memory:	*Consult with ISD for current recommendation.*	
Bus:	*EISA, ISA, VESA, or PCI.*	
Mouse:	*System should be equipped with a mouse.*	

For university environments, in addition to the above listed configurations for an IBM compatible workstation, the option of a UNIX based workstation is available. The UNIX standard should have as a minimum:

UNIX Environment

Operating System:	*POSIX compliant/OSF Version V compliant operating system with OSF/MOTIF presentation interface is acceptable.*
System Unit:	*Select hardware from the same vendor that is providing the UNIX operating system to ensure compatibility. Be certain the system unit is sized to handle the throughput requirements of the imaging system.*

5. Imaging Application Hardware Platform

Platform selection needs to be reviewed on a case-by-case basis given the large number of vendors and variety of computing platforms available in the imaging arena. It is not the intent of this document to set a standard for the application hardware platform. When agencies adhere to the Standards and Recommendations set forth in this document (i.e., TCP/IP, IPX, CCITT, compression, etc.), the selected application hardware platform should integrate with the existing state/university network and data interchange environment.

RECOMMENDATION:
Agencies should involve the appropriate technical organization (ISD or university computer center management) early in the decision process when selecting an application hardware platform.

E. IMAGES, INDEXES, AND DATA

1. Image Distribution

The distribution of images is key to the full utilization of a standardized imaging system. Imaging equipment should be capable of sending an image to another workstation, FAX machine, through the network, and also be received by this equipment.

STANDARD:
The system must be able to distribute images in one of the following formats, at the option of the sender:

- *CCITT Group 3 or Group 4 FAX (recognizing Group 3 destination).*
- *Bit-mapped.*

2. Image Annotation and Modification

Image annotation is the ability to put date stamps, reference numbers, notes, etc. to the document being scanned. These annotations then become useful for clarifying documents or for editing purposes.

RECOMMENDATION:
The imaging system should support the ability to annotate an image without physically modifying the image.

3. File Headers

Image file headers for electronic data are important parts of an electronic imaging media storage system. Use of proprietary image file headers makes it difficult to ensure the long-term intelligibility of electronic images when system upgrades or modifications occur. Therefore, non-proprietary image file header structures are essential. Tagged Image File Format (TIFF) has been adopted as a de facto standard for file header information. However, there are several different implementations of TIFF and different TIFF types (standard and compressed), so selecting TIFF does not automatically guarantee there will be no problems in transferring images from one system to another.

STANDARD:
Use non-proprietary file header formats to label digital images.

Require the system developer to supply a detailed definition of the image file header label structure. (Note: A TIFF file header standard has been developed by the CCITT group.)

4. Image Folder Management

Imaging provides the capacity to store associated documents in the electronic equivalent of a file folder, although the documents are received at different times. This is a particular advantage of electronic imaging storage and is one key difference between digital images and micrographics, which are recorded sequentially. Associated documents received over a period of years can be added to existing "folders" on one disk, or if stored on several disks, accessed randomly and compiled from various disks as if they were physically stored together.

RECOMMENDATION:
Image folder management software should support the combining of images into a single folder and should allow access to a single image in a folder.

5. Image Indexing

Indexing is based on the image content description (i.e., client number, client name, case number, etc.).

STANDARD:
Image indexing must be done using an American National Standards Institute (ANSI) Standard Query Language (SQL) Data Base Management System (DBMS) which can

reside remote from the image storage location. The index must be accessible and manipulatable through user-written standard application development languages, subject to the appropriate security considerations.

6. Image Entry

This is the ability to enter images into the imaging system from scanners, other computers, FAX machines, digital cameras, etc. and index the images as they enter the system.

RECOMMENDATION:
The imaging system should provide automatic indexing at entry from bar codes, Optical Character Recognition (OCR), Intelligent Character Recognition (ICR), and/or operator entry. As these technologies evolve, use industry standards wherever possible and avoid proprietary equipment, unless proper precautions are taken (see Section P "System Migration").

7. Redundant Index

In the typically installed eletronic imaging media system today, the database index used for retrieval of images stored on electronic imaging media is maintained on a separate magnetic disk or tape system. In certain circumstances there may be an advantage in placing the index data pertaining to the contents of each disk on the disk itself as well as on a peripheral device of the operating computer. Placing the index data at more than one location on the disk ensures that as long as the disk is readable and there is software available to interpret what is read the index information will not be lost.

STANDARD:
The index data for the contents of a specific disk must be written at more than one location on the disk. Also, note "when" the index is actually written to disk. Software must rewrite the index every time the disk is unloaded.

GLOSSARY

Access: permission to use and reproduce records; may be limited or qualified (restricted) by the agency that has legal custody of the records.

Agency: all executive branch departments, those agencies allocated to the state board of education under 2-15-1511, M.C.A., all attached boards, commissions, and their staffs, the Montana university system and units of that system under the board of regents, the legislative branch, and the judicial branch.

Archival quality: a medium that can be expected to permanently retain its original characteristics and can be expected to resist deterioration. Durability refers to certain lasting qualities with respect to folding, tear resistance, etc. Archival quality is controlled by national standards.

Archives: (a) the noncurrent records of an organization preserved because of their continuing, or enduring, value and that have been accepted for deposit in the Montana State Archives's custody; (b) the organization or agency responsible for appraising, accessioning, preserving, and making available permanent records; the building or portion thereof, where permanent records are located after being accessioned by the archival agency. In Montana State Government, the Montana Historical Society houses the Montana State Archives and the Montana State Archivist determines which records have sufficient historical or other value to warrant their continued preservation by State Government.

Archiving: removing information from on-line to off-line storage, often using a hierarchy of storage devices (i.e., electronic imaging disk, magnetic disk, disk caches, etc.).

Bandwidth: the range of frequencies, expressed in hertz (Hz), that can pass over a given transmission channel. The bandwidth determines the rate at which information can be transmitted through the circuit. The greater the bandwidth, the more information that can be sent through the circuit in a given amount of time.

Binary scanner: a scanner that records each pixel as only black or white.

Bit-map(ped): a matrix of thousands of small dots or pixels, each of which is stored as a single binary digit (bit) in a computer.

CD-E: CD-Erasable, is an electronic imaging platter that can be erased and rewritten. Synonymous with rewritable disk, but not to be confused with CD-R disk, which is recordable once only.

CD-R: an electronic imaging platter that can be recorded by the user with relatively low-cost

equipment. Like WORM disks, once recorded, CD-R may not be erased or rewritten.

Compressed file: an image file that has been electronically reduced in size for storage purposes. Smaller file sizes are generally preferred to maximize storage media use and to facilitate faster data access.

Compression: the method by which redundant digital image data streams are reduced to much smaller sizes, resulting in lowered digital storage and data transmission requirements.

Continuous-tone: an image containing various gray shades, requiring half-toning and gray-scaling techniques for best image reproduction. Photographs are continuous-tone, as opposed to a written page, which tends to be two-tone (only black and white).

Conversion: to change backlog documents (through the use of scanning) into some form of electronic imaging media.

DASD: Direct Access Storage Device, which is a basic type of storage medium that allows data to be accessed by positioning the medium or accessing mechanism directly at the storage location. The time required for such access is independent of the location of the data most recently accessed. Synonym for random access. File organizations can be sequential, direct, or indexed sequentially.

DBMS: Data Base Management System, a software program that provides a systematic approach to storing, updating, and retrieval of information stored as data items, usually in the form of records in a file, where many users access common data banks.

DPI: Dots Per Inch, which is a method of defining image resolution or definition. DPI is linked to pixel sizes, with smaller pixels yielding higher dpi and increased image definition.

Disposition: the actions taken regarding records no longer needed in current office operation, including transfer to agency storage facilities or the State Records Center, transfer from one State agency to another, transfer of permanent records to the Montana State Archives, or disposal of temporary records.

Document: a material object upon which information is written, transcribed, or recorded.

Documentation: (a) the act or process of substantiating by recording actions and/or decisions; (b) records required to plan, develop, operate, maintain, and use electronic records and software, including, but not limited to, systems specifications, file specifications, codebooks, record layouts, user guides, and output specifications.
Enhancement refers to the use of mathematical algorithms to improve the quality of digitally scanned images. The term also includes techniques that may be used to modify the scanned image for structural reasons, such as bordering to remove any unwanted scanned areas

surrounding the actual document page, de-skewing to rectify the scanned image to correct for any skew in the placement of the document on the scanner, or margin adjustment to ensure that pages are properly aligned with each other.

Ethernet: a local area data network that is a contention based protocol. An individual station "listens" for an all clear signal in order to gain access to the network. Once access to the network has been granted then the station broadcasts its message and releases the network when the transmission is finished.

Expungement of records: the process by which record of criminal conviction is destroyed or sealed after expiration of time (Black's Law Dictionary, 1991, 6th Edition). Expungement is a court ordered deletion of records (e.g., juvenile criminal records are expunged when juvenile reaches the age of eighteen).

Filing system: the planned method of arranging and indexing records.

Gray-scale: the capture of various shades of gray existing in typical document images. Usually requires increased storage in digital systems to capture more shades of gray.

Half-tone: a way of representing gray-scale or color graphic objects as a series of dots. Half-toning can create the illusion of gray-scale.

Image: an electronic data file consisting of digital data that, when reconstructed either on a display screen or hard-copy print, appears as the original document.

Image folder: multiple images, often scanned at different times, electronically linked so as to be either accessible as a unit or individually. An image folder is analogous to a file folder in a manual system.

Imaging: the capability to capture, store, retrieve, display, process, manipulate, and distribute a digital representation of a document, person, or thing.

Imaging system: hardware and software for computers which record complete images by the integration of digital scanning technology, high-density storage on an electronic imaging recording medium, indexed rapid retrieval, and the ability to reproduce the entire original image.

Indexing: (a) assignment of physical location and document identification information (e.g., date, creator, contents) to search for and retrieve desired images.
Integration: (a) combining various pieces of hardware and software, often acquired from different vendors, into a unified system; (b) combining computer programs into a unified software package so that all programs can share common data.

Jukebox: an electronic imaging disk storage system that utilizes robotic devices containing

shelves and automated picking mechanisms to store multiple disks and provide automatic digital image delivery.

LAN: Local Area Network, a data communications system that spans a physically limited area, generally involving distances of less than two miles.

Legal value: the usefulness of records containing evidence of legally enforceable rights or obligations of government or citizens.

Life cycle of records: the management concept that records pass through three stages: creation, maintenance and use, and disposition.

Long-term value or **long-term record**: a document which must be retained for 10 years or more.

Micrographics: the techniques associated with the production and handling of microfilm, microfiche, and related storage technologies based on retaining a photographic representation on film.

Microform: the generic term covering all forms of micrographics, such as film, fiche, aperture cards, etc.

OCR: Optical Character Recognition, a technology that can analyze a bit-map of printed or written characters, determine what the characters are, provide them as direct input to a computer system. This permits capturing input data at the entry source, bypassing additional processing operations.

Electronic imaging disk or **electronic imaging platter**: a noncontact, random-access disk tracked by optical laser beams and used for mass storage and retrieval of digitized text and graphics.

OSI: Open Systems Interconnection, a framework for network standardization developed by the International Standards Organization (ISO). The basic model consists of seven layers:

1 - Physical Layer: provides the mechanical and electrical interface.
2 - Data Link Layer: transmits packets of bits between two points, with error detection.
3 - Network Layer: addresses and routes message packets.
4 - Transport Layer: ensures error-free transmission of message packets.
5 - Session Layer: controls the sequencing of message packets that constitute a networking session.
6 - Presentation Layer: provides services such as encryption and translation between different data- representation codes.
7 - Application Layer: interacts with the user.

Permanent records: records having sufficient historical or other value to warrant continued preservation by the State Government beyond the time they are needed for a particular agency's administrative, legal, or fiscal purposes; sometimes called archival records. Permanent value is determined by the State Records Committee.

Pixel: picture element, or one of many millions of small dots that collectively comprise a digital image. Usually referred to as number per inch, such as 200 pixels per inch.

Raster: a scanning pattern used in generating, recording, or reproducing television, facsimile, or graphics images on a screen; raster scanning.

Records or **public records**: any documentary materials, regardless of physical form or characteristics, made or received by a state agency in connection with the transaction of public/ official business and preserved for the informational value or as evidence of a transaction or as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the Government and all other records or documents required by law to be filed with or kept by an agency of the State. Section 2-6-205, M.C.A., provides that "all public records are and shall remain the property of the State."

Records management: the planning, controlling, directing, organizing, training, promoting, and other managerial activities related to the creation, maintenance and use, and disposition of records to achieve adequate and proper documentation of State policies and transactions and effective and economical management of agency operations. Sections 2-6-201 through 2-6-213 and 2-15-1013 (Public Records Management Act) details the records management program for the State, which in Montana is administered by the Secretary of State's Office, Records Management Bureau.

Records retention schedule: a document containing an itemized list of recurring or nonrecurring records series or information systems with the corresponding time periods for which they must be kept and their final disposition, which has been approved by the State Records Committee (see Section 2-6-204, M.C.A.).

Records series: file units of documents arranged according to a filing system or kept together because they relate to a particular subject or function, result from the same activity, document a specific kind of transaction, take a particular physical form, or have some other relationship arising out of their creation, receipt, or use, such as restrictions on access and use. Non-electronic records are generally scheduled by series, whereas electronic records, including records on imaging systems, are generally scheduled by information system.

Rewritable disk: synonymous with CD-E, an electronic imaging platter that, unlike WORM disks, can be erased, written over, or otherwise reused.

SQL: Structure Query Language, a *de facto* standard that enables users to access a variety of

databases on micros, minis, and mainframes using generic commands and syntax.

State Records Committee: a committee established by Section 2-15-1013, M.C.A., composed of representatives of the Department of Administration, the Legislative Auditor, the Attorney General, the Montana Historical Society, and the Secretary of State, to approve retention schedules for public records, approve records disposal, and to generally oversee state-wide records management.

Storage density is the compaction techniques used in recording information on electronic imaging disks. It is directly related to the total amount of user storage space available.

Substrate: the physical surface of an electronic imaging disk. The substrate of an electronic imaging disk contains material used to electronically capture an image (e.g., polycarbonate, tempered glass, etc.).

Temporary records: records approved by the State Records Committee for disposal either immediately or after a specified retention period of 10 years or less.

TIFF: Tag Image File Format, a *de facto* standard file format designed to promote the interchange of digital image data. It is a bit-mapped graphics format for scanned images with resolutions of up to 300 dots-per-inch. It simulates gray-scale shading.

Token ring: a local network access mechanism and topology in which a supervisory frame or token is passed from station to station in sequential order. Stations wishing to gain access to the network must wait for the token to arrive before transmitting data. In a token ring, the next logical station receiving the token is also the next physical station on the ring.

Vital records: those records that are essential for the operation and function, or reconstruction of same, of a state agency. These records require some form of security backup, whether in an electronic medium, microform, or paper.

WAN: Wide Area Network, which is a data network connecting large numbers of nodes and LANs that are geographically remote.

WORM disk: write-once-read-many electronic imaging disk that can store user data (*write*) and can be accessed (*read*) when needed. WORM disks cannot be erased or re-used like conventional magnetic media.

APPENDIX A

Imaging Committee Members:

Tammy Anders	Lewis and Clark County
Dewey Barnes	Department of Public Health and Human Services
Brett Boutin	Department of Administration
Ed Eaton	Secretary of State
Terry Kramer	Department of Administration
Kathie Otto	State Archives, Historical Society
Curt Secker	Department of Revenue
Rod Sheppard	Teacher's Retirement System
Gary Warren	Teacher's Retirement System
Tom Woodgerd	Department of Justice